NAVAL POSTGRADUATE SCHOOL
Monterey, California

THESIS

WORLDWIDE METEOROLOGICAL AND OCEANOGRAPHIC DATA DISTRIBUTION USING THE GLOBAL BROADCAST SERVICE

by

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June 2001

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13. ABSTRACT ***(maximum 200 words)***

The Fleet Numerical Meteorology and Oceanography Center (FNMOC) produces large meteorological and oceanographic (METOC) data files in support of regional METOC centers worldwide. These data files can be from 50 megabytes to 1 gigabyte in size and can take up to one hour and twenty-eight minutes to send across a T-1 (1.544 Megabits per second (Mbps)) line due to physical limitations and network delays. However, not all of FNMOC's customers have access to a T-1 line. For example, the Naval European METOC Center (NEMOC) in Rota, Spain is hampered by an inadequate telecommunications infrastructure compared to Continental United States (CONUS) standards. This thesis addresses the operational feasibility of using the Global Broadcast Service (GBS), a global system of satellites providing a high speed broadcast service of video and data, for transferring large METOC data products from FNMOC to METOC regional centers around the world.

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WORLDWIDE METEOROLOGICAL AND OCEANOGRAPHIC DATA DISTRIBUTION USING THE GLOBAL BROADCAST SERVICE

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Submitted in partial fulfillment of the
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ABSTRACT

The Fleet Numerical Meteorology and Oceanography Center (FNMOC) produces large meteorological and oceanographic (METOC) data files in support of regional METOC centers worldwide. These data files can be from 50 megabytes to 1 gigabyte in size and can take up to one hour and twenty-eight minutes to send across a T-1 (1.544 Megabits per second (Mbps)) line due to physical limitations and network delays. However, not all of FNMOC's customers have access to a T-1 line. For example, the Naval European METOC Center (NEMOC) in Rota, Spain is hampered by an inadequate telecommunications infrastructure compared to Continental United States (CONUS) standards. This thesis addresses the operational feasibility of using the Global Broadcast Service (GBS), a global system of satellites providing a high speed broadcast service of video and data, for transferring large METOC data products from FNMOC to METOC regional centers around the world.

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To my Lord and Savior Jesus Christ, no words are written without you.

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I. INTRODUCTION

A. BACKGROUND

The Mission of Fleet Numerical Meteorology and Oceanography Center (FNMOC) is:

> ...to combine innovative technology with the best available science in order to provide the best weather and oceanographic products, data and services to the operating and support forces of the Department of Defense, anywhere, anytime. (http://www.fnmoc.navy.mil)

The major consumers of FNMOC generated products, data, and services are the regional meteorology and oceanography (METOC) centers located in Rota, Spain; San Diego, California; Yokosuka, Japan; Pearl Harbor, Hawaii; and Norfolk, Virginia. Information is provided to these centers in the form of data derived from weather models at FNMOC such as the Naval Operational Global Atmospheric Prediction System (NOGAPS). These data files can be from 50 megabytes to 1 gigabyte in size and can take up to one hour and twenty-eight minutes to send across a T-1 (1.544 Megabits per second (Mbps)) line due to physical limitations and network delays.

Not all of FNMOC's customers have access to a T-1 line. For example, the Naval European METOC Center (NEMOC) in Rota, Spain is hampered by an inadequate telecommunications infrastructure compared to CONUS telecommunications standards. As a result, NEMOC's download rates are less than 56 kilobits per second (Kbps). This impedes meteorologists at NEMOC from receiving data from the NOGAPS model in enough time to provide forecasts that are within the same day (24 hours) or next day (48 hours).

Enter the Global Broadcast Service (GBS): a global system of satellites providing a broadcast service of video and data. Depending on the configuration of the spot beam, GBS can transmit information to receiving stations at data rates from 1.54 Mbps to 24 Mbps. Customers would only need a receiving suite and to be in the footprint of the satellite to access this information. What once took hours to download would now only take seconds. If weather information, currently used extensively in missions such as targeting, route planning, and air mission planning, could be delivered to the warfighter via GBS, that data would be much more timely, relevant and useful in decision-making.

B. PURPOSE

The purpose of this study will be to examine the C^3 (command, control, communications), scheduling, and bandwidth issues associated with transferring large amounts of data across great geographic distances. In this examination, the author hopes to determine if it is operationally feasible to use the GBS for transferring large data products from FNMOC to METOC regional centers around the world.

C. METHODOLOGY

The methodology used in this thesis research consisted of the following:

- A literature search of books, magazine articles, CD-ROM systems, the World Wide Web, and other library information resources was conducted to gather information about the Global Broadcast Service.
- A visit to FNMOC was conducted in order to conduct interviews with FNMOC personnel to discuss administrative and operational issues, conduct a review of weather models, and design a data transfer experiment involving GBS.
- A visit to the GBS Satellite Broadcast Manager in Wahiawa, Hawaii and the Naval Pacific Meteorological Oceanographic Center/Joint Typhoon Warning Center (NPMOC/JTWC) was conducted in order to discuss, design, and conduct the data transfer experiment.

- A visit to CINCPAC MSQ 126, USCINCPAC was conducted in order to identify all potential hardware, software, and protocol compatibility issues.
- The experiment was designed, conducted, and evaluated.

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II. OVERVIEW OF THE GLOBAL BROADCAST SERVICE

A. MISSION AND VISION

The stated mission of the GBS is:

> Provide the Warfighter with an affordable, worldwide, seamless, high throughput space-based broadcast information service to support today and tomorrow's missions. (http://www.gbsjpo.net)

The vision of GBS is:

> Be the premier supplier of high-bandwidth information to support the warfighter in their fielded range of operational constraints. Widely recognized for leveraging commercial capability at low cost, enabling our warriors to operate inside any adversary's Decision Cycle. (http://www.gbsjpo.net)

B. SYSTEM SUMMARY

Operations DESERT SHIELD/STORM forced the Department of Defense (DoD) to realize that the available military and commercial satellite communications systems were limited in their ability to provide high-volume communications to deployed military units. The Global Broadcast Service (GBS) was conceived to meet this need and provide a worldwide, high-capacity information pathway to expeditiously deliver information products directly to the warfighter. The GBS was designed to provide products requiring large bandwidth such as video, imagery, and weather maps to static, mobile, and forward deployed forces at a time and place of the warfighter's choosing. Table 1 compares the high bandwidth capability of GBS versus other military communication satellite systems.

SATCOM Throughput	2.4 Kbps MILSTAR & UFO	64 Kbps LOCE	512 Kbps SIPRNET	1.544 MILSTAR MDR	**23 Mbps GBS**
Example Data					
Air Tasking Order (DS) 1.1 MB	1.02 hr	2.61 min	17.19 sec	5.7 sec	**.38 sec**
Tomohawk MDU .03 MB	100 sec	4.29 sec	.47 sec	.16 sec	**.01 sec**
Imagery 24 MB	**22.2 hr**	**57 min**	**6.25 min**	**2.07 min**	**8.4 sec**
Pacific Ocean METOC DATA 13.124 MB	**12.15 hr**	**27.34**	**3.4 min**	**1.13 min**	**4.5 sec**

Table 1. Existing DoD SATCOM Systems Limited Support Communications Capacity (from Van Dolson, "GBS 101", 2000, Naval Space Command)

In March 1996 GBS was established as a joint military program and was initially fielded to the United States Pacific Command (USPACOM). (http://214.3.0.34/GBSbackground.html) For further historical information on GBS please refer to Delpino, J.M., Leanord, C.L., and Yarbrough, A.D., "The Global Broadcast Service: A System Overview and Acquisition Summary," GBS Joint Program Office, Alexandria, Virginia, 1997.

The GBS system consists of a Control Segment, a Space Segment, and a Ground Segment; each will be discussed in a subsequent section. Figure 1 illustrates the different segments of the GBS. The Control Segment consists of a Satellite Broadcast Manager (SBM), a Primary Injection Point (PIP), and Theater Injection Points (TIPS). The Space Segment consists of GBS payloads on the Ultra High Frequency Follow-On (UFO) satellites. The GBS Ground Segment consists of the GBS Receive Suite

Broadcast Mangers (RBMs), which come in three different types: fixed ground stations, transportable units, and shipboard units. (http://214.3.0.34/GBSbackground.html)

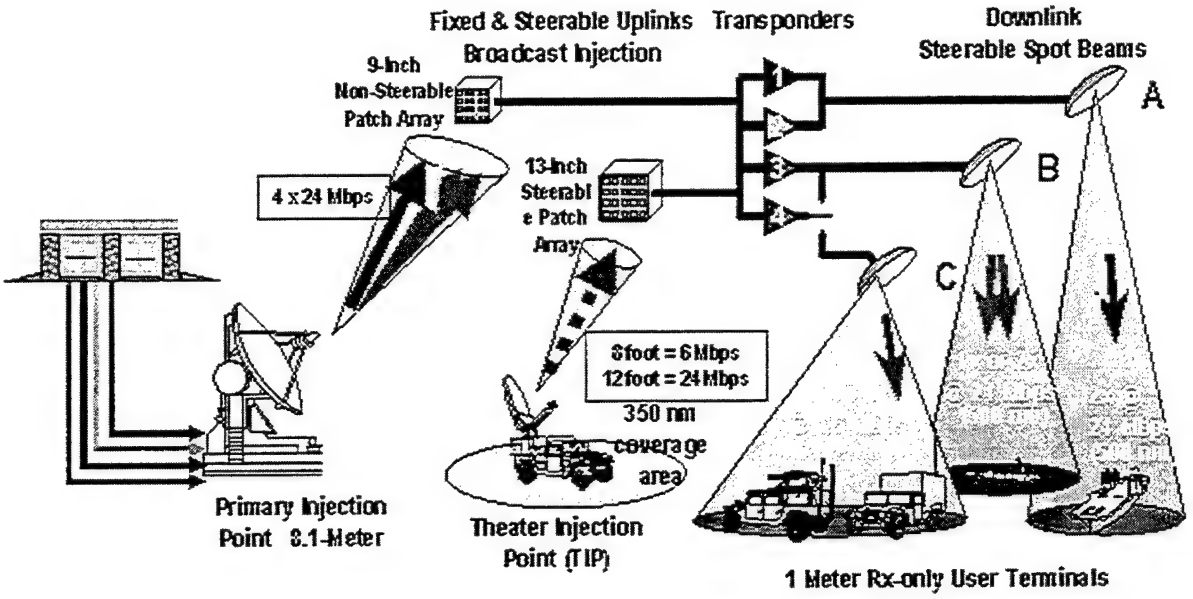

Figure 1. The Global Broadcast Service Concept of Operations (from Dolson, "GBS 101", 2000, Naval Space Command)

The SBM collects information products that are requested by the user, designs a broadcast stream, and transmits the stream to the UFO satellite. On board the satellite, the GBS payload uses three steerable downlink antennas to transmit the signal to GBS receive suites in the satellite's field of view (FOV). The RBMs then distribute the information to the end user via a local area network (LAN) and/or video monitors.

C. CONTROL SEGMENT

Three SBMs provide the PIP for products for the GBS payloads onboard UFO-8, UFO-9, and UFO-10. These facilities are located at Wahiawa, Hawaii; Norfolk, Virginia; and Sigonella, Italy. The SBM functions in close partnership with the Theater

Information Manager (TIM) in building information products for end users. The SBM gathers data for these products through several different paths including the Non-Classified Internet Protocol Router Network (NIPRNET), the SECRET Internet Protocol Router Network (SIPRNET), the Global Command and Control System (GCCS), and File Transfer Protocol (FTP). (http://214.3.0.34/GBSbackground.html) The SBM also provides a help desk that serves as the single point of contact between users and support organizations. The help desk is designed to be staffed by a watch team consisting of three to five people working around-the-clock. (http://214.3.0.34/GBSSBM.htm)

D. SPACE SEGMENT

The GBS payloads are onboard the UFO 8,9, and 10 satellites. The GBS system is the tertiary payload of the satellite and independent of the satellites' UHF and Extremely High Frequency (EHF) payloads. The GBS payloads onboard UFO 8, 9, and 10 satellites provide the DoD with near global coverage except for the continental United States (CONUS), which is covered using commercial Ku-band satellites. (http://info.gbs-pacom.navy.mil)

The GBS payload for each satellite consists of two uplink antennas (one fixed uplink patch array and one steerable patch antenna), four transponders, and three steerable downlink antennas. The downlink antennas consist of two minimum 500 nautical mile (nm) diameter coverage area spot beams which provide data broadcast up to 24 Mbps each and one 2000 nm wide-area spot beam which provides a data broadcast stream of 1.54 Mbps.

The payload operates in the "bent pipe" configuration: uplink (U/L) signals are received, converted to a down link (D/L) frequency, switched to the appropriate down

link transponder, and re-transmitted via the appropriate spot beam (i.e. no demodulation or signal processing is done on board the spacecraft). Figure 2 illustrates the GBS payload diagram. (Dolson, "GBS 101", 2000, Naval Space Command)

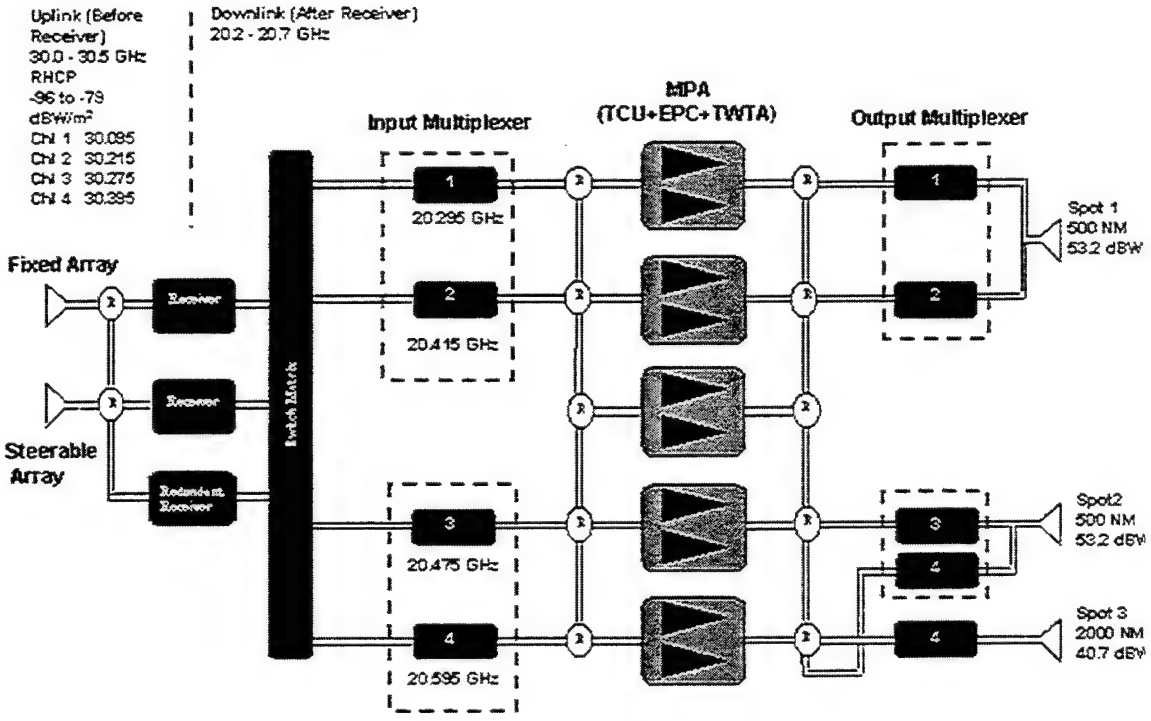

Figure 2. GBS Payload Diagram (from Dolson, "GBS 101", 2000, Naval Space Command)

E. GROUND SEGMENT

There are six types of receive suites, each serving different operational unit types:

- Transportable Ground Receive Suite (TGRS)
- Shipboard Receive Suite (SRS)
- Sub Surface Receive Suite (SSRS)

- Fixed Ground Receive Suite (FGRS)
- Airborne Receive Suite (ARS)
- Man Portable Receive Suite (MPRS)

Each receive suite consists of a Receive Terminal, Cryptographic Equipment, and a Receive Broadcast Manager (RBM). They are capable of receiving one broadcast stream, operate as a stand-alone unit or Local Area Network (LAN) connection, and can operate unattended once installed. See Figure 3.

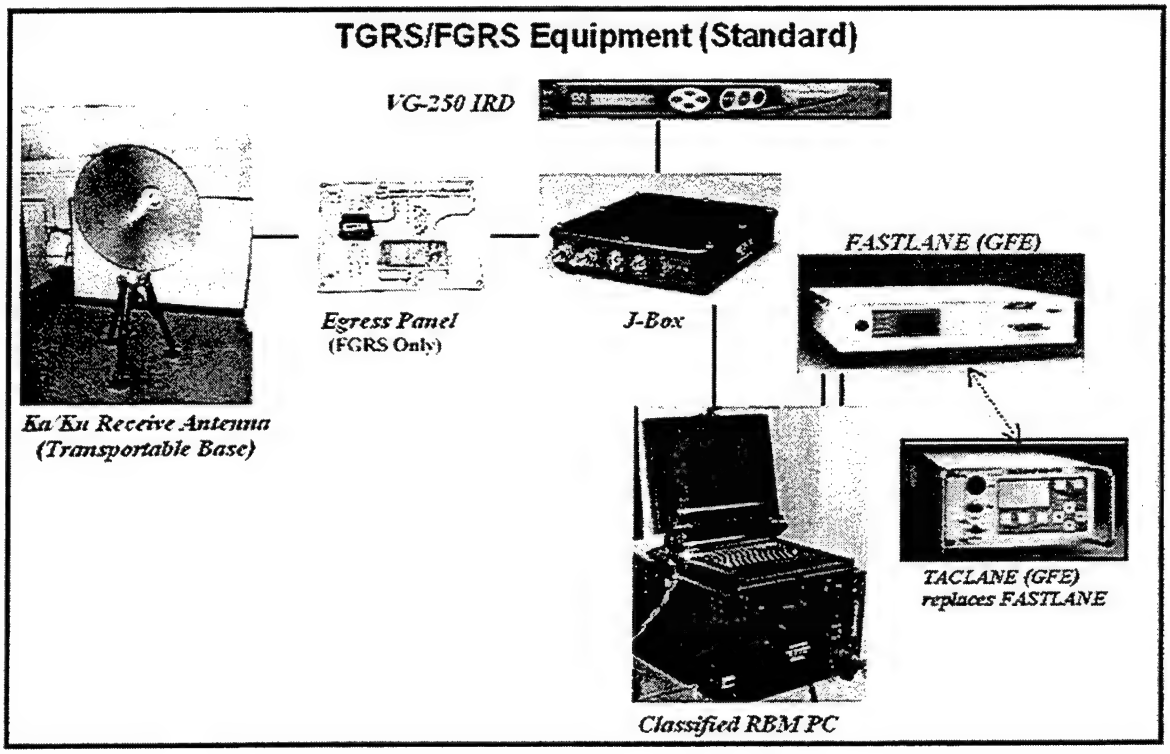

Figure 3. GBS Receive Equipment (from http://www.gbsjpo.net)

III. OVERVIEW OF THE FLEET NUMERICAL METEOROLOGY AND OCEANOGRAPHY CENTER (FNMOC)

A. MISSION

The stated mission of FNMOC is:

> To combine innovative technology with the best available science in order to provide the best weather and oceanographic products, data, and services to the operating forces of the DoD anywhere, anytime. (http://www.fnmoc.navy.mil)

This study seeks to support FNMOC's mission by improving its capability to provide the METOC products and services to regional METOC centers worldwide.

B. ORGANIZATION

Fleet Numerical Meteorology and Oceanography Center (FNMOC) is located at the Naval Postgraduate School Annex in Monterey, California. FNMOC is a third-echelon command under the Commander, Navy Meteorology and Oceanography Command (CNMOC), United States Navy (see Figure 4). FNMOC is recognized in the Department of Defense (DoD) as the primary numerical prediction center for operational meteorological and oceanographic analysis and forecast products globally. It has earned international recognition as an operational numerical weather center and is the international leader in worldwide oceanographic and coupled air-ocean forecasting.

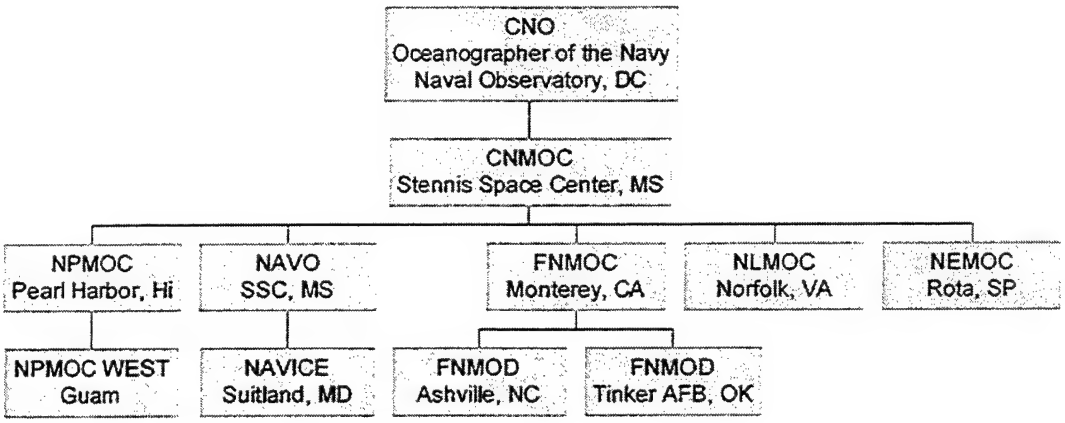

Figure 4. FNMOC Monterey, California Chain of Command

C. OPERATIONS

FNMOC's workforce consists of 40 officers, 50 enlisted, and 160 civilian workers composed of government employees and private contractors. With this workforce FNMOC conducts around the clock operations, supporting the DoD, Allied forces, and civilian agencies and organizations worldwide. FNMOC continuously collects and updates a comprehensive database of worldwide oceanographic and atmospheric observations. In near real time these observations are analyzed using an advanced suite of METOC models, hosted on some of the most modern computers available- including four Cray supercomputers (see Figure 5). These products are then transmitted to customers worldwide.

The scope of the analysis and forecast models includes from the top of the atmosphere to the bottom of the ocean. Specific attention is focused on the environmental conditions near the air-sea-land interface as it is in this area where most naval operations occur. To model the environment, FNMOC collects over 7 million data

points and weather observations a day at a rate of over 80 per second. A suite of supercomputers running the NOGAPS model processes these data. The resulting products (over 450,000 daily) are distributed to users around the world through a variety of communications links, dial-up networks, and the World Wide Web (WWW).

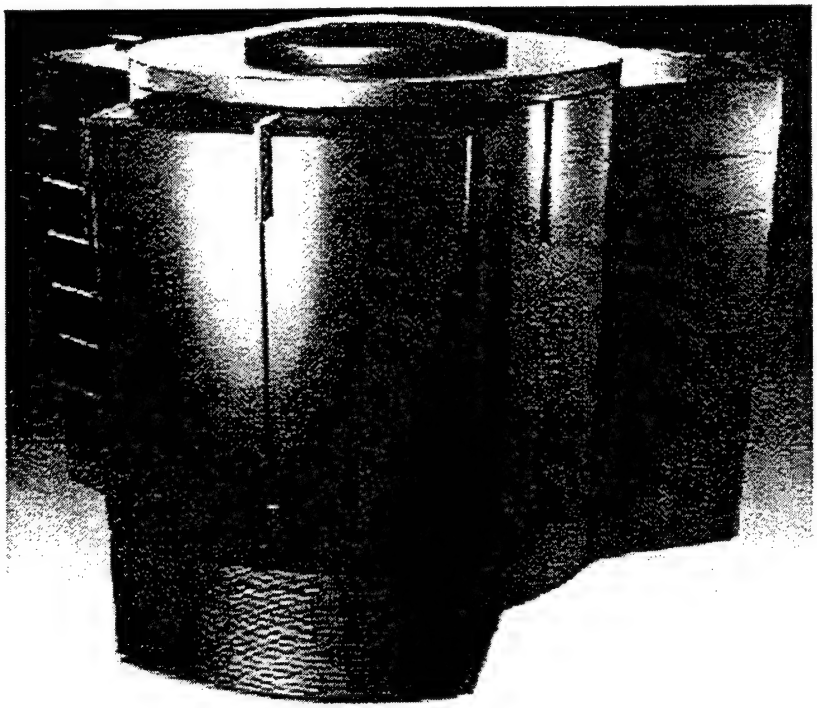

Figure 5. Cray Super Computer

D. NAVAL OPERATIONAL GLOBAL ATMOSPHERIC PREDICTION SYSTEM (NOGAPS)

NOGAPS is the only executing global DoD weather model. It is the most important model executing because it sets the boundary conditions that allow regional models to execute, such as those run by the U.S. Air Force Weather Agency (AFWA) and the National Oceanic and Atmospheric Administration (NOAA). Several other models at FNMOC use NOGAPS data such as the Ensemble Forecast System (EFS) and the Wave Amplitude Model (WAM). See Figure 6 for a graphic representation of NOGAPS

output. This very robust program has the ability to compare current readings with previously held data and run an algorithm to determine the weather forecast for a particular region out to 144 hours. See Table 2 for a summary of the model's details. The global coverage provided by this model means one thing; NOGAPS creates very large data sets. For instance, the Pacific Ocean METOC data set is, on average, 13.1 Mbytes and the Surface Global data set is 13.4 Mbytes. GBS is a potential solution to transmit these large data sets to weather centers around the world, independent of host nation telecommunications infrastructures.

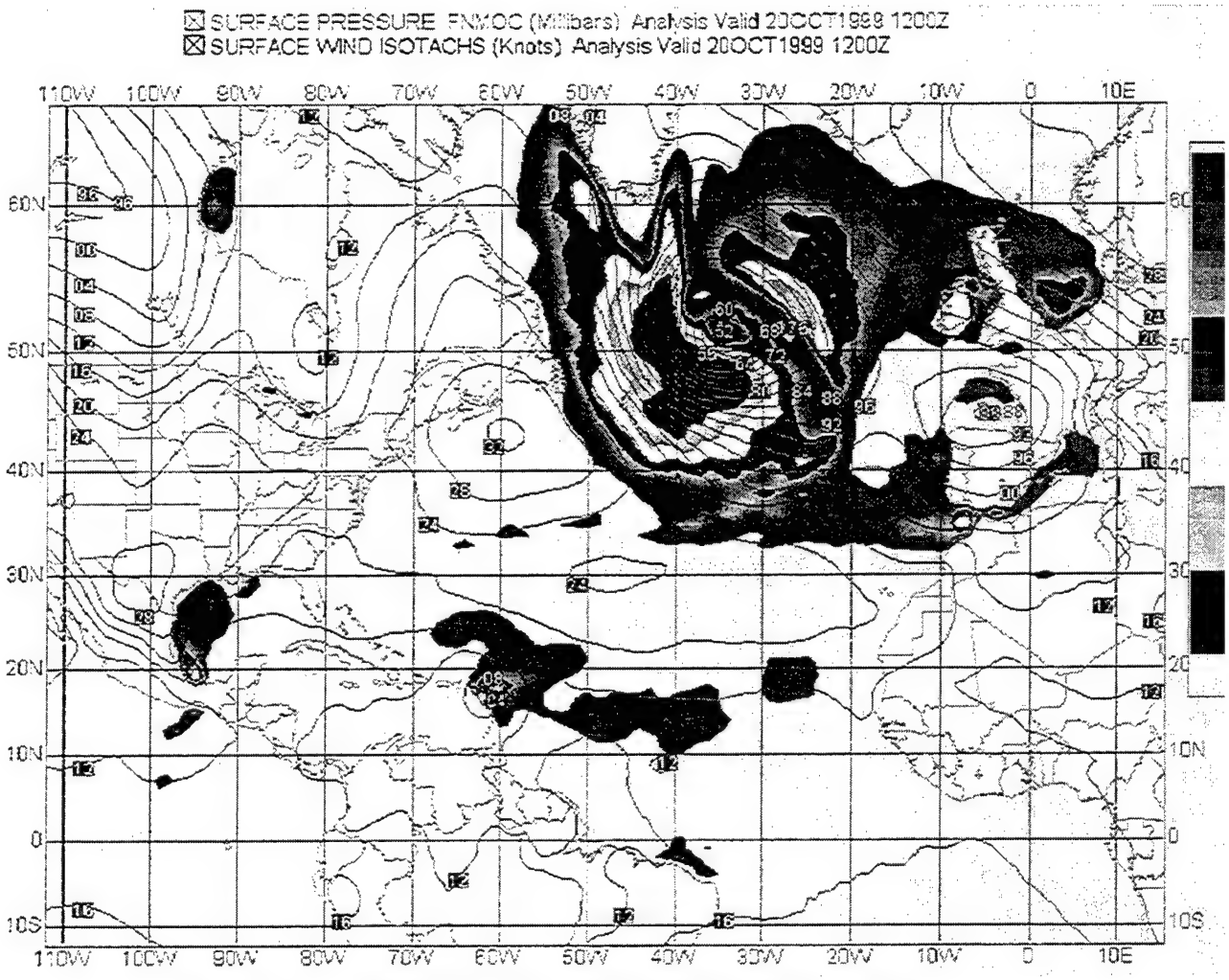

Figure 6. NOGAPS (from http://www.fnmoc.navy.mil)

Basic equations:	Primitive equations with hydrostatic approximation
Independent variables:	Latitude, longitude, hybrid pressure coordinate, sigma levels
Dependent variables:	Vorticity, divergence, virtual potential temperature, specific humidity, surface pressure, ground temperature, ground wetness and cloud fraction
Numerical techniques:	Horizontal spectral differencing, second-order finite difference in the vertical, and central time differencing with Robert semi- implicit corrections
Integration domain:	Global, surface to 1 mb
Horizontal resolution:	T159 (~0.75 degree on the Gaussian grid)
Vertical levels:	24 sigma levels with approximately 6 sigma levels below 850 mb, depending on terrain elevation
Forecast time:	144 h from the 00Z and 12Z ops run
Initial fields:	Machenhauer initialization of increments from the +/- 3 hour cut-off Optimum Interpolation Analysis
First-guess fields:	Previous NOGAPS 6-h or 12-h forecast
Orography:	Spectrally truncated and Lanczos filtered heights from the U. S. Navy 10 minute field
Horizontal diffusion:	Linear, fourth-order LaPlacian for vorticity, divergence and temperature
Moisture physics:	Convective precipitation (Emanuel), shallow cumulus mixing (Tiedtke) and large-scale convection
Radiation:	Long-wave and short-wave radiation (Harshvardhan) computed every 2 hour
Land surface:	Single layer/bucket model
Ocean surface:	Sea surface temperature and ice coverage percentage from U. S. Navy OCEAN MVOI.

Table 2. NOGAPS Model Details (from http://www.fnmoc.navy.mil)

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IV. TEST

A. OBJECTIVE

The purpose of the test was to evaluate the operational feasibility of using the Global Broadcast Service to distribute FNMOC's meteorological and oceanographic data to regional meteorological and oceanographic centers.

B. SET UP

The test was conducted from April 9-11, 2001 at Pearl Harbor Navy Base, Oahua, Hawaii.

1. Participants

- CINCPAC MSQ 126, USCINCPAC
- Satellite Broadcast Manager, Global Broadcast Service, Wahiawa, Hawaii
- Naval Pacific Meteorological and Oceanographic Center (NPMOC)

2. Equipment

- User (client) computer: Laptop computer with an Intel Pentium processor running Microsoft Windows 2000® with Joint Meteorological Viewer (JMV) software installed. [1]
- GBS Receive Broadcast Manager Equipment Suite: This includes a military hardened desktop computer running Microsoft Windows NT 4.0 Server ® See Figure 7
- 10-Port Network Hub
- Category –5 Network Cable

[1] JMV or the Joint METOC Viewer is an application that runs as a helper application for a web browser. With JMV, the user can display in a graphical format the output of FNMOC's numerical meteorological and oceanographic models as well as real time observations from around the globe. Weather charts, overlayed images, looping fields and briefing images can be created with JMV. (http://www.fnmoc.navy.mil/PUBLIC)

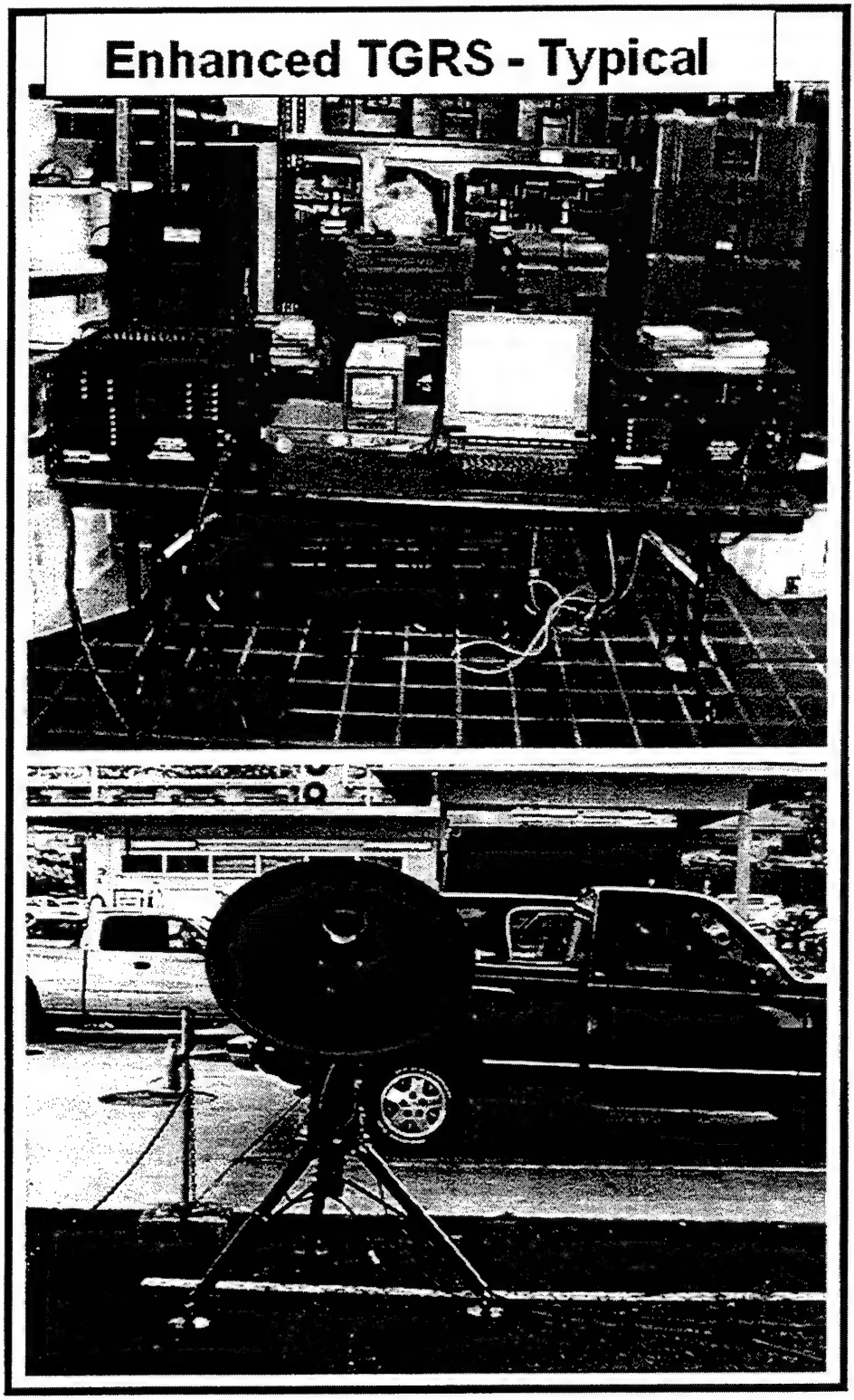

Figure 7. Transportable Ground Receive Suite/Field Ground Receive Suite (from http://www.gbsjpo.net)

3. Timeline

Monday, April 9, 2001: A coordination meeting was conducted at NPMOC. At this meeting a GBS Mission Request Form was completed and delivered to the GBS SBM in order to obtain support for the test (see Appendix B). On this day a site visit was conducted at the headquarters of CINCPAC MSQ 126.

CINCPAC MSQ 126 is a mobile, tactical satellite communications platoon that provides expeditionary communications support to the United States Commander-in-Chief Pacific (USCINCPAC). MSQ 126 was fielded with a GBS Receive Broadcast Manager Suite in the winter of 2001.

Tuesday, April 10, 2001: A site visit of the GBS SBM facility was conducted in the morning. The GBS SBM facility is located at the Naval Computer Telecommunications Area Master Station (NCTAMS) Pacific in Wahiawa Hawaii. During the afternoon testing was conducted at CINCPAC MSQ 126. The test results will be discussed in the next section

Wednesday, April 11, 2001: An attempt was made to repeat the test results of April 10th. During the afternoon an out-brief was conducted with the Commanding Officer of NPMOC. The results from the test were discussed as well as follow-on projects to explore the utilization of GBS as a delivery tool for METOC data.

C. RESULTS

The test was a limited success. With the completed GBS Mission Request Form the GBS SBM configured the information product for broadcast. The GBS SBM facility servers accessed the NPMOC web page that was built for the test. This web page was

then downloaded via the Internet and placed in the servers at the GBS SBM for broadcast. The product consisted of a web page that contained two Joint Meteorological Viewer (JMV) thumbnails[2] generated from the NOGAPS model data that was downloaded by NPMOC from FNMOC (see Figure 8).

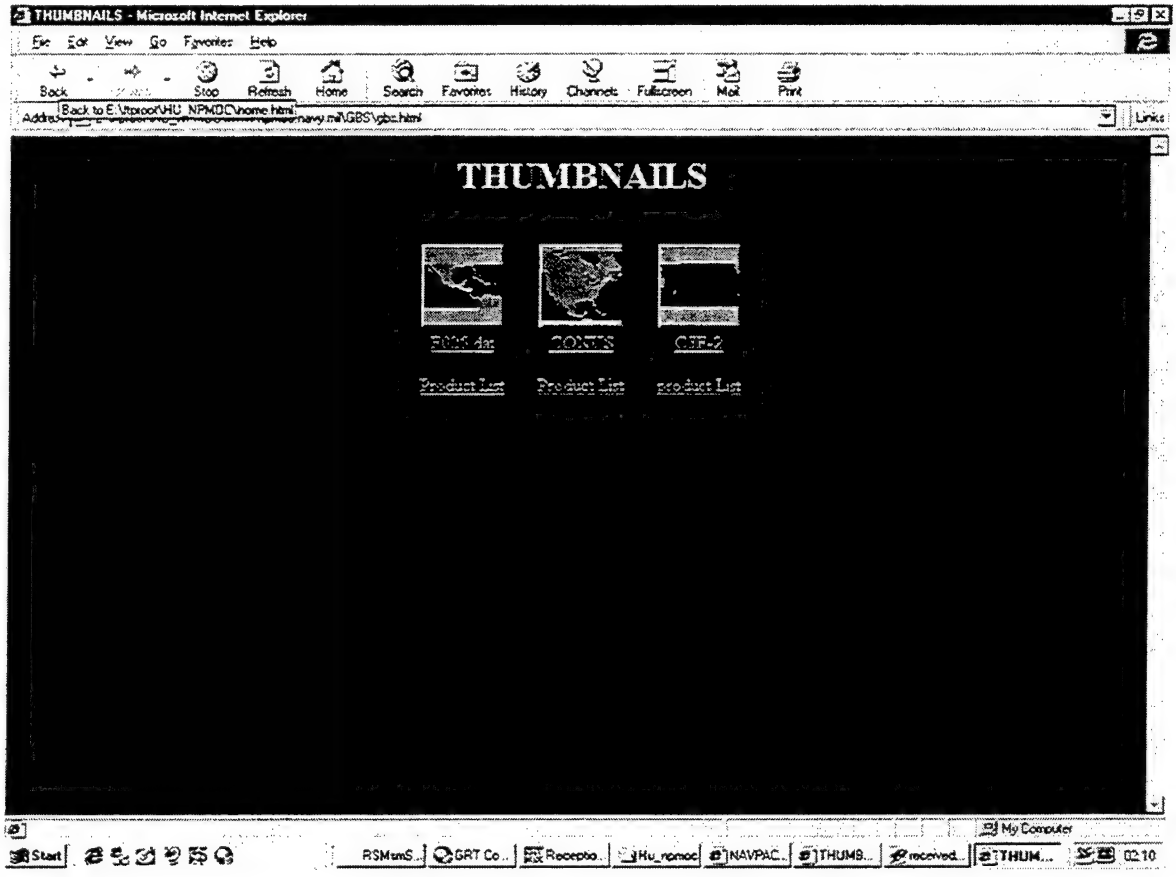

Figure 8. JMV Thumbnails Received During the Test

On April 10, 2001 the GBS SBM facility's system transmitted the product. The product was received at the Receive Broadcast Manager (RBM) of MSQ 126. Due to software malfunctions the test team did not know exactly when the product was actually received

[2] A "thumbnail" is an icon showing the geographical area that the data package covers. Generally, each thumbnail will have a Product List link below it that will show the user the list of products contained in the thumbnail. Using JMV, the user can download the products included in the thumbnail and decode them for viewing. (Joint METOC Viewer (JMV) Version 3.4 Series Users Guide, 2000, p. 27)

or how long the product was in transit from the GBS SBM facility to the RBM at MSQ 126. This software malfunction indicated that the product was still being received when the product was actually in storage on the RBM computer (Figure 9). The test team determined that the product must have been received due to the transmit speed (using the 2000 nautical mile spot-beam at 1.54 Mbps), the size of the file (70 MB), and verified delivery through a manual search of the database. The time it took to transmit was estimated to be 6.06 minutes. The test team called the GBS SBM Help Desk for technical support and received advice that lead to the discovery of where the data was stored on the machine. The GBS SBM notified the GBS Joint Program Office of the problem. A software patch was sent to the field the next day and installed. However, this did not fix the problem, as later testing on April 10th would indicate. The GBS Joint Program Office is pursuing a solution.

The product was received and stored in the File Transport Protocol (FTP) directory of the RBM server. The test team opened the file and viewed the web page created by NPMOC for the test as depicted in Figure 8. Using Joint Meteorological Viewer (JMV) software the thumbnails were un-zipped and the test team was able to view and manipulate NOGAPS weather model data. (See Figure 10)

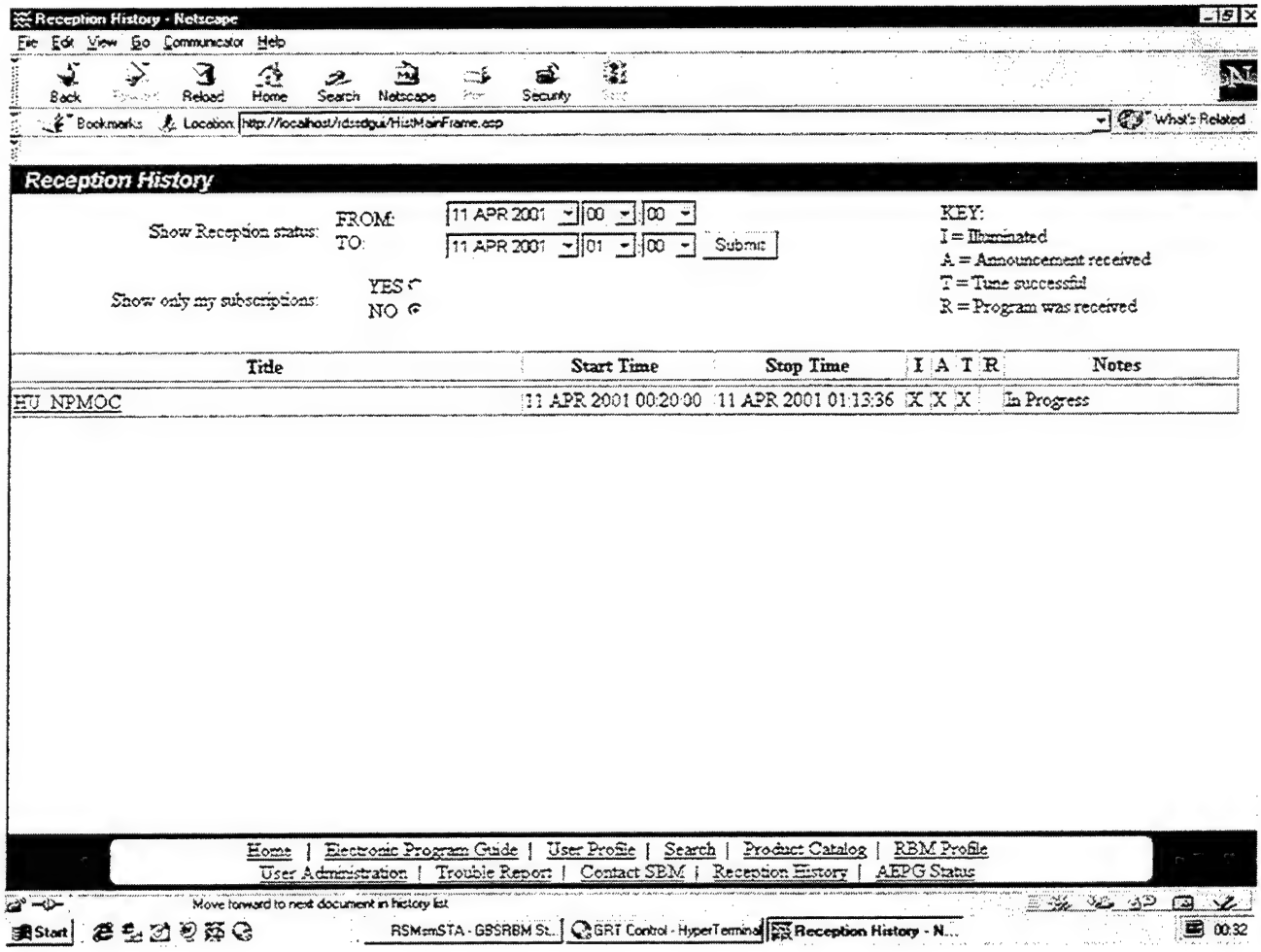

Figure 9. GBS Test Reception History

On April 11th an attempt was made to replicate the previous day's test. This session was unsuccessful because the GBS RBM could not obtain a link with the satellite, UFO-8. The test team's hypothesis for this was that the GBS spot beam had been redirected to another geographical location to support other GBS testing. This hypothesis was not confirmed. CINCPAC MSQ 126 personnel and the GBS SBM Help Desk undertook efforts to link with the satellite but no solution was found to obtain a link that day.

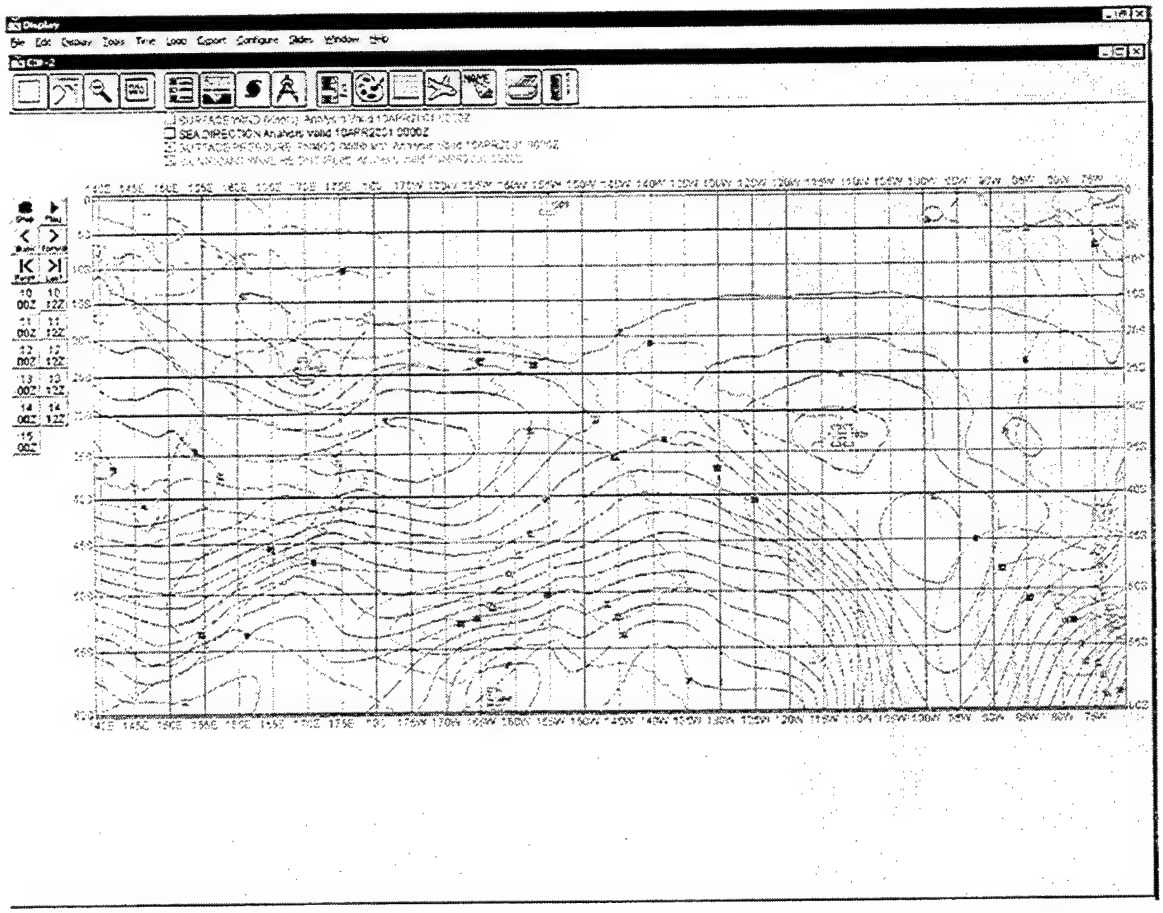

Figure 10. Received files from the GBS test.

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V. CONCLUSIONS AND RECOMMENDATIONS

A. CONCLUSION

The Global Broadcast Service is a viable communications system that can be used by FNMOC to deliver weather model data to regional METOC centers. The bandwidth available on the GBS makes it the system of choice to transport large METOC data files to regional METOC centers which are dependent upon bandwidth challenged host nation telecommunication infrastructures (i.e. Yoko, Japan; Rota, Spain). Data transfers that used to take hours now may only take seconds or a few minutes depending upon the size of the file.

The capabilities of the GBS to provide a high speed data transfer of METOC data to regional weather centers will be limited in the near future due to the following challenges:

- The small number of GBS RBM units in the DoD: Fielding of GBS RBM units are ongoing. Currently there are between 30-40 units fielded. The GBS Joint Program Office has purchased 96 terminals.
- The inexperience of military personnel who are trained in operating the GBS RBM units: The training of personnel responsible for operating GBS RBM units is provided by the primary contractor, Raytheon Systems Company. It is approximately one week long and is based on an Integrated Electronic Technical Manual (IETM) which is on a CD ROM. Training takes place on-site with the GBS RBM owning unit. The GBS SBM help desk provides post-training support.
- The METOC community's lack of knowledge about the capabilities and limitations of GBS.
- The immaturity of the GBS as a system: The program was formally established as a Joint program in 1996. Earlier experimental versions of GBS were fielded as early as 1998. The current version of the product was first fielded in October of 2000.

- The limited number of satellite data broadcast beams on-board UFO 8,9, and 10: In addition to UFO 8,9, and 10, two commercial satellites have been leased to provide coverage to CONUS and European commands. GBS payloads will also be on board the Wide Band Gapfiller Satellites with an estimated initial operation capability of Fiscal Year 2004-2005

B. RECOMMENDATIONS

The Global Broadcast Service has the potential to revolutionize data delivery within the METOC community. However, this cannot occur without a great deal of future study. Other related areas of study, which should be explored include:

- A concept of operations for the fielding and operation of GBS RBM terminals to the METOC community in the U.S. Navy. This study could address the funding required; installation, operation, maintenance, and training issues; the number of GBS terminals required to effectively support remote METOC customers.
- Development of a software tool, which could automate the process of requesting METOC products from FNMOC and then placing them on the GBS, broadcast with minimal manual handling of the request.
- An Information Dissemination Management Plan for utilization of GBS by the DoD.

APPENDIX A. LIST OF ACRONYMS AND/OR ABBREVIATIONS

Acronym	Definition
CD ROM	Compact Disc Read Only Memory
CINCPAC	Commander-in-Chief Pacific
CNMOC	Commander, Navy Meteorology and Oceanography Command
CONUS	Continental United States
D/L	Down/Link
DoD	Department of Defense
EFS	Ensemble Forecast System
FNMOC	Fleet Numerical Meteorology and Oceanography Center
FOV	Field of View
GBS	Global Broadcast Service
GBS RBM	GBS Receive Broadcast Manager
GBS SBM	GBS Satellite Broadcast Manager
LAN	Local Area Network
LOCE	Linked Operations-Intelligence Centers Europe
METOC	Meteorology and Oceanography
NEMOC	Naval European METOC Center
NIPRNET	Non-Classified Internet Protocol Router Network
NOAA	National Oceanic and Atmospheric Administration
NOGAPS	Naval Operational Global Atmospheric Prediction System
PACOM	Pacific Command
SIPRNET	SECRET Internet Protocol Router Network
TIM	Theater Information Manager
TOMAHAWK MDU	Mission Data Update
U/L	Up/Link
WAM	Wave Amplitude Model

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APPENDIX B. GBS MISSION REQUEST FORM

The GBS Mission Request is used by information managers, command staff, users, etc. when initiating, adding, dropping, or changing GBS services. Changes may include a change in operational status, user location, and/or the period of service. Submit through the requesters' chain of command to the CINC's GBS information management organization for approval. Confirmations of approval will be returned through the process chain. Requests should be submitted as far in advance as possible, and updated, as new information becomes available. Security levels, copyright laws, and authority to release products to third parties must be addressed when products are to be broadcast to a Coalition enclave.

Date Time Group (DTG) of Request (GMT): (1) _____ **DTG of Previous Request (if any)** (2) _____

Name: (3) _____ **Title** (4) _____ **Organization:** (5) _____

Commercial Tel: (6) _____
DSN Tel: (7) _____
Email: (8) _____
AUTODIN/DMS Address (if Applicable): (9) _____

Type of Request **(10)**

Add Mission ____ **Delete Programs** ____ **Change PIM / Location** ____ **Add Unit** ____
Delete Mission ____ **Add Programs** ____ **Change Support Window** ____ **Delete Unit** ____
Other ____

Recommended JCS Priority (Note 3) (11) _____

Location Where Products are Required: (12) _____

Classified PIM data, flightpath, or deployment location should be provided under separate cover via SIPRNET or AUTODIN/DMS message to Lead TIM and serving SBM.

Associated Mission Name (13) _____

RBM (Owning Unit) (14) _____

Associated Unit(s) (15) _____

Timeframe (GMT) when Products are Required: (16) _____

Security, Copyright, or Release Issues: (17) _____

REQUESTED PROGRAM INFORMATION

Program Name	Originator/URL	Format (Note 1)	Network Classification	Periodicity of Transmission
(18)	(19)	(20)	(21)	(22)

Comments:

- Originator/producer) POC information: Name/Rank/Organization non-secure DSN and cml telephone numbers/secure DSN and cml telephone/e-mail address/remarks (required if account and/or password required to obtain access to source server.
- Restriction of delivery times (e.g. only between 0100Z and 0400Z)

Note 1:**Formats may include:**

Streamed Data Services
Synchronous Serial
UNCLAS Audio/Video

Data File Services
File Transfer
Web Service

Network Stream Services
COP

Check with servicing SBM to confirm Current availability of formats

Delete the remaining pages when submitting request.

Note 2 : GBS Lead Theater Information Managers and SBM Contact Information

UFO-8 GBS Broadcast Manager, USPACOM, Camp Smith HI and SBM (Wahiawa, HI)		
	GBS Broadcast Manager	SBM Help Desk
Commercial/DSN	(808) 477-0688 / (315) 477-0688	(808) 653 -5050 / (315) 453-5050
Secure calls via STU-III	(808) 477-0688 / (315) 477-0688	(808) 653 -5050 / (315) 453-5050
Unclassified FAX	(808) 477-4110 / (315) 477-4110	(808) 653-7490 / 453-7490
Secure FAX	(808) 477-4110 / (315) 477-4110 call (808) 477-7567 / (315) 477-7567	Not available at this time.
Unclassified e-mail	pacgbstim@hq.pacom.mil	helpdesk@gbs-pacom.navy.mil
SIPRNET e-mail	pacgbstim@hq.pacom.smil.mil	helpdesk@gbs-pacom.navy.smil.mil
AUTODIN/DMS	USCINCPAC HONOLULU HI//J63/TCCC//	GBS SBM PAC HONOLULU HI//SBM//
Hours of Operation	The Help Desk hours of operations depend on current activities. During unstaffed hours, a voice mail system is available.	

UFO-9 GBS Lead Theater Information Manager USJCOM, Norfolk VA and SBM (Norfolk VA)		
	GBS Lead TIM	SBM Help Desk
Commercial/DSN		(757) 444-9190 / 564-9190
Secure calls via STU-III		(757) 444-8981/8993 / 564-8981/8993
Unclassified FAX		(757) 444-9158 / 564-9158
Secure FAX		
Unclassified e-mail		helpdesk@gbs-norfolk.navy.mil
SIPRNET e-mail		helpdesk@gbs-norfolk.navy.smil.mil
AUTODIN/DMS		GBS SBM LANT NORFOLK VA//N31C//
Hours of Operation	The Help Desk hours of operations depend on current activities. During unstaffed hours, a voice mail system is available.	

UFO-10 GBS Lead Theater Information Manager USJCOM Norfolk VA and SBM (Sigonella Italy)		
AUTODIN/DMS		GBS SBM EURCENT SICILY IT//SBM//

Note 3: JCS Priority
Indicates the operational priority of the network as defined in CJCSI 6250.01. The priority of the product should be submitted as low as possible. Values are:

Priority 0. Assigned only by NCA/CJCS for emergent critical contingency support
Priority 1. Strategic Order (essential to national survival)
1A System Control/Orderwire
1B National Command Authorities
- 1B1 Presidential Support
- 1B2 Secretary of Defense Support
- 1B3 Envoy and Emissary Support

1C Strategic and Threat Warning/Intelligence
1D SIOP/Force Direction Requirements

Priority 2. Warfighting Requirements
2A Department of State Diplomatic Negotiations
2B CJCS Support
2C CINC Operations
2D JTF or CTF Operations
2E Component Operations (Theater Forces)
2F Tactical Warning and Intelligence
2G CJCS-Sponsored Select Exercises
2H Counter-narcotics Operations

Priority 3. Essential Non-Warfighting Operational Support
3A Humanitarian Support
3B Intelligence and Weather
3C Logistics
3D Radio Frequency Interference (RFI) Resolution
3E Diplomatic Post Support
3F Space Vehicle Support
3G Other Service Support

Priority 4. Training
4A CJCS Sponsored
4B CINC Sponsored
4C MAJCOM, MACOM, Echelon 2 Sponsored
4D Unit Sponsored

Priority 5. VIP Support
5A Service Secretaries
5B Service Chiefs
5C CINC Travel
5D Other Travel

Priority 6. RDT&E and General
6A DoD Sponsored Testing
6B DoD Sponsored Demonstrations
6C DoD Administrative Support
6D DoD Quality of Life Initiatives

Priority 7. Miscellaneous
7A DoD Support to Law Enforcement
7B Other Non-DoD Support
7C Non-US Support as approved by the authorized organization
7D Other

Note: CINCs and other users rank order within a category when multipl accesses are assigned the same priority.

GBS Mission Request Form Legend

KEY	COMMENTS
1	Enter the Date Time Group of the request in Zulu time, for example: ***081000Z May 01***
2	Date time group of any previous related request:, ***061000Z April 01***
3	Last, First Name and Middle Initial of the requester, for example ***Smith, Ian M.(CAPT)***
4	Functional Title within the organization, for example **Operations Officer**
5	Full Organizational Title, for example ***2nd Battalion, 3rd Marines, First Marine Division, I ME***
6	Complete commercial telephone number where the individual in line 2 can be reached, for example ***(XXX) XXX-XXXX***
7	Complete DSN telephone number where the individual in line 2 can be reached, for example ***(XXX) XXX-XXXX***
8	Complete email address where the individual in line 2 can be reached, for example ***smithim@marine.mil***
9	Plain Language Address Designator for the command in line 3, for example ***2BN3MAR//G6//***
10	Check the appropriate block under the type of request.
11	Recommended JCS Priority (Note 3) i.e. **4A CJCS Sponsored Training**
12	Physical location in latitude and longitude or a place name where the products are needed.
13	Provide assigned mission/operation or exercise name, i.e. **Operation Win All**
14	Full organizational title of the unit that owns the RBM, i.e. ***9th Communications Battalion, I MEF***
15	Full organizational title for the unit(s) that will be served by this RBM, i.e. xxxx
16	Date time group when the information products are required to be delivered, for example ***111000Z May 01 to 23000Z May 01***
17	Security, Copyright, or Release Issues: OPR and status of action - must be cleared before broadcast
18	Provide a name that best encompasses the information, i.e. Intel - order of battle, Logistics - POL
19	Universal Resource Locator for the requested information.
20	Provide the expected format of the data (See Note 3).
21	Highest classification of the originators network, for example ***SECRET***
22	Insert how often during a 24 hour cycle do you need the information, for example ***12 hours= twice a day, 24 hours =once a day, 48 hours=once every other day***
23	Additional information pertinent to the mission and broadcast

APPENDIX C. REQUESTING A NEW PRODUCT FOR BROADCAST ON THE GBS

The information provided below was extracted from the *Standard Operating Procedures for Global Broadcast Service*, 24 August 1999, OPR: HQ USCINCPAC/J6337. See Figure 11 for a graphical representation of this process.

1. Determine required new video or data information product.

2. If the information is a web-based product, identify the Uniform Resource Locator (URL). An example would be: "http://www.jsf.com/test/3dec.htm"

3. Fill out the GBS Mission Request Form (Appendix B) or GBS GMR message (Appendix D). Minimum data required includes:
   a. Complete Uniform Resource Locator (URL), if product is web-based
   b. Description of the data
   c. Frequency of data collection, also known as "crawl". This frequency should be dependent on how often information product is updated; i.e. once per day, once per week
   d. Depth of crawl, if known
   e. Start date and time that the broadcast is required
   f. Stop date and time for the broadcast
   g. Latitude and Longitude that the spot-beam is required to be pointed to during requested broadcast

4. Submit the GBS Product Request Form in softcopy to the GBS PACOM Theater Information Manager (TIM) and copy the request to the GBS SBM Officer and the Satellite Broadcast Manager (SBM) Helpdesk in Hawaii.

5. The TIM will submit the request to the GBS Information Management Board (GIMB) for approval. The GIMB is co-chaired by the USCINCPAC J2 and J3 with members from the HQ USCINCPAC staff directorates.

6. The TIM will direct the SBM to conduct a collection/broadcast feasibility study on the requested product. The SBM will immediately report its findings, and a technical solution if warranted, to the GBS TIM.

7. The TIM will notify the requestor of the GIMB approval/disapproval for the New GBS Information Request and the results of the SBM feasibility study.

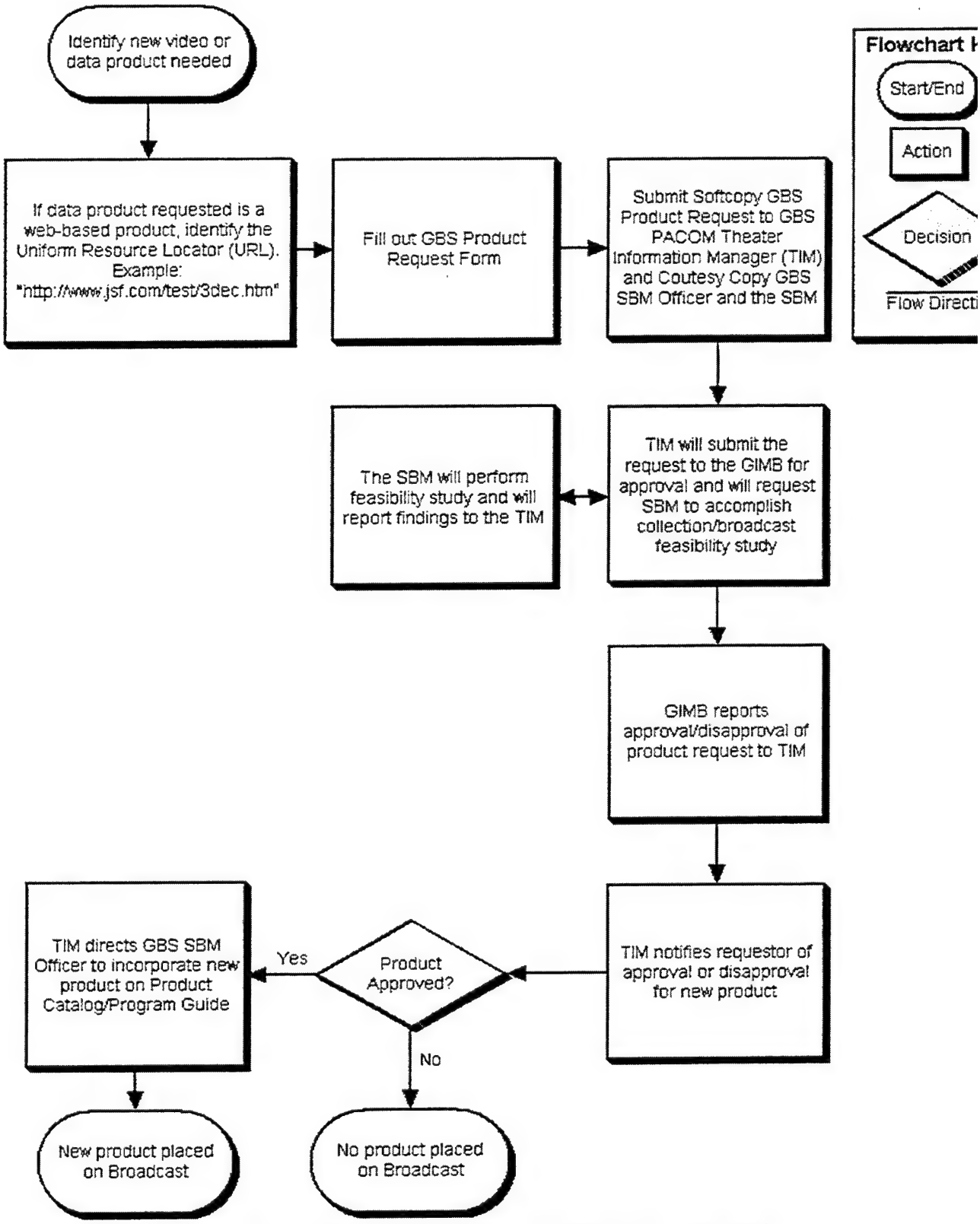

Figure 11. Requesting a New Product for Broadcast on the GBS (http://214.3.0.34/ops_newproduct.htm)

APPENDIX D. GBS MISSION REQUEST (GMR) MESSAGE

GBS Mission Request (GMR) Format (http://214.3.0.34/GBS_GMR.doc)

1. The GBS Mission Request is used by information managers, command staff, users, etc. when initiating, adding, dropping, or changing GBS services. Changes may include a change in operational status, user location, and/or the period of service. Submit through the requesters' chain of command to the CINC's GBS information management organization for approval. Confirmations of approval will be returned through the process chain. Requests should be submitted as far in advance as possible, and updated, as new information becomes available. Security levels, copyright laws, and authority to release products to third parties must be addressed when products are to be broadcast to a Coalition enclave.

2. Units will submit GMRs via their JTF, Sub-Unified or component command for validation. Units will address GMRs as follows:

FM *ORIGINATOR*
TO *USPACOM COMPONENT, SUB-UNIFIED COMMANDER OR JTF*
INFO *USCINCPAC HONOLULU HI//J63/TCCC//*
GBS SBM PAC HONOLULU HI/SBM

3. JTFs, Sub-Unified or component commands will forward validated GMR(s) to USCINCPAC GBS Information Management Board through USCINCPAC/J63/TCCC for approval and implementation. The GBS broadcast development is normally a 72-hour process; however, requests for new, untested programs/products may require unique systems arrangements, engineering solutions, equipment purchase, and extensive testing. Direct contact with the J632T GBS Broadcast Manager (GBM) and the SBM are recommended for those type requirements. Component, Sub-Unified commander or JTF will address GMRS as follows:

FM *USPACOM COMPONENT, SUB-UNIFIED COMMANDER OR JTF*
TO *USCINCPAC HONOLULU HI//J63/TCCC//*
INFO *GBS SBM PAC HONOLULU HI/SBM*
NOTE: Readdressal will not be accepted only quoted messages.

4. USCINCPAC GIMB will approve the GMR, validate mission, and assign the priority IAW CJCSI 6250.01/1999. Upon validated, USCINCPAC J63 GBM will coordinate with the SBM and take action to build the requested broadcast within three days. If not validated, USCINCPAC J63 GBM will return the request.
5. USCINCPAC J63 will accept an alternative to an AUTODIN/DMS message. That alternative must be addressed to PACGBSTIM@HQ.PACOM.SMIL.MIL and be in USMTF ASCII format.

NOTE 1: ***The [ITALICS] indicate the information that has to be provided by the requesting user or staff planner.***

[*CLASSIFICATION*]

SUBJECT: *REQUEST FOR GBS MISSION BROADCAST*

[REFERENCE A, B, AND C, ETC. (AS NECESSARY) /MESSAGE CLASSIFICATION /MESSAGE DTG /FROM ADDRESSEE /SUBJECT]

[*NARRATIVE: DESCRIPTION OF REFERENCES*]

1. *REQUESTOR: NAME/RANK (IF APPLICABLE) ORGANIZATION/NON-SECURE DSN AND CML TELEPHONE NUMBERS/SECURE DSN AND CML TELEPHONE NUMBERS/ E-MAIL ADDRESS/REMARKS.*

2. *TYPE OF REQUEST: (ADD MISSION, DELETE MISSION, ADD PROGRAMS, DELETE PROGRAMS, CHANGE PIM/LOCATION, CHANGE SUPPORT WINDOW, ADD UNIT (S), DELETE UNIT (S), OTHER.).*

3. *RECOMMENDED MISSION PRIORITY: (USE CJCSI 6250.01)*

4. *LOCATION WHERE BROADCAST REQUIRED: SITE NAME, LATITUDE/LONGITUDE, UTM GRID COORDINATES, PIM DATA, OR FLIGHTPATH.*

5. *MISSION DESCRIPTION/OPERATION/UNCLAS NAME/ (E.G., CURRENT OPERATIONS (KOREA, JAPAN, ETC.), EXERCISE (UFL, COBRA GOLD, ETC.), CONTINGENCY (JTF FULL ACCOUNTING, ETC.).*

A. MISSION NAME
B. *RBM NAME AND OWNING UNIT*
C. ASSOCIATE UNIT (S) (IF ANY)
D. *BROADCAST START DTG (ZULU)/BROADCAST STOP DTG (ZULU)*

6. *PROGRAMS REQUESTED*:

A. *PROGRAM NAME (DAILY INTELLIGENCE BRIEF, KOREA WEATHER, ETC)*

B. *FORMAT (FILE TRANSFER, WEB SERVICE, UNCLAS AUDIO/VIDEO, SYNCHRONOUS SERIAL, EMAIL, IP MULTICAST, ASYMMETRIC INTERNET, OR COP - SEE GBS CONOPS/SOP FOR DEFINITIONS)*

C. *NETWORK CLASSIFICATION LEVEL (NIPRNET, SIPRNET, GCCS-K, OR SPECIAL)*

D. *PERIODICITY OF COLLECTION AND TRANSMISSION OF A PRODUCT (EVERY 2 HOURS, 8 HOURS, 24 HOURS, ETC.)*

7. COMMENTS: ADDITIONAL INFORMATION

A. ORIGINATOR/PRODUCER (POC INFORMATION: NAME/RANK/ORGANIZATION NON-SECURE DSN AND CML TELEPHONE NUMBERS/SECURE DSN AND CML TELEPHONE/E-MAIL ADDRESS/REMARKS

(REQUIRED IF PASSWORD AND ACCOUNTS REQUIRED TO OBTAIN ACCESS TO SOURCE SERVER)

B. RESTRICTION ON DELIVERY TIME (E.G. ONLY BETWEEN 0100Z AND 0400Z)

8. FOR LOCAL USE AS REQUIRED

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